2.14 Series (Key)

Name _____ Date _____ Period _____

Write each sum using summation notation, assuming the suggested pattern continues.

1. $-7-1+5+11+\ldots+53$

$\sum_{k=1}^{11}(6k-13)$

2. $2+5+8+11+\ldots+29$

$\sum_{k=1}^{10}(3k-1)$

3. $1+4+9+\ldots+(n+1)^2$

$\sum_{k=1}^{n+1}k^2$

4. $1+8+27+\ldots+(n+1)^3$

$\sum_{k=1}^{n+1}k^3$

5. $6-12+24-48+\ldots$

$\sum_{k=0}^{\infty}6(-2)^k$

6. $5-15+45-135+\ldots$

$\sum_{k=0}^{\infty}5(-3)^k$

Find the sum of the arithmetic sequence.

7. $-7,-3,1,5,9,13$

18

8. $-8,-1,6,13,20,27$

57

9. $1,2,3,4,\ldots,80$

3240

10. $2,4,6,8,\ldots,70$

1260

11. $117,110,103,\ldots,33$

975

12. $111,108,105,\ldots,27$

2001

Find the sum of the geometric sequence. Round to the nearest thousandths.

13. $3, 6, 12, ..., 12,288$

$24,573$

14. $5, 15, 45, ..., 98,415$

$147,620$

15. $42, 7, \frac{7}{6}, ..., 42\left(\frac{1}{6}\right)^8$

$50.4\left(1-\left(\frac{1}{6}\right)^9\right) \approx 50.4$

16. $42, -7, \frac{7}{6}, ..., 42\left(-\frac{1}{6}\right)^9$

$36-\left(\frac{1}{6}\right)^8 \approx 36$

Find the sum of the first *n* terms of the sequence. Round to the nearest thousandth. The sequence is either arithmetic or geometric.

17. $2, 5, 8, \ldots; n=10$

155

18. $14, 8, 2, \ldots; n=9$

-90

19. $6, -3, \frac{3}{2}, \frac{-3}{4}, \ldots; n=11$

$4\left(1+\left(\frac{1}{2}\right)^{11}\right) \approx 4.002$

20. $4, -2, 1, \frac{-1}{2}, \ldots; n=12$

$\frac{8}{3}\left(1-\left(\frac{1}{2}\right)^{12}\right) \approx 2.667$

21. $-1, 11, -121, \ldots; n=9$

$-196,495,641$

22. $-2, 24, -288, \ldots; n=8$

$66,151,030$

23. Find the first six partial sums of the following infinite series. If the sums have a finite limit, write "convergent". If not, write "divergent".

a) $0.3 + 0.03 + 0.003 + 0.0003 + \ldots$ {0.3, 0.33, 0.333, 0.3333, 0.33333, 0.333333};Conv.

b) $1 - 2 + 3 - 4 + 5 - 6 \ldots$ {1, -1, 2, -2, 3, -3}; divergent

Determine whether the infinite geometric series converges. If it does, find its sum.

24. $6+3+\frac{3}{2}+\frac{3}{4}+\ldots$

converges; 12

25. $\frac{1}{64}+\frac{1}{32}+\frac{1}{16}+\frac{1}{8}+\ldots$

divergent

26. $\sum_{k=1}^{\infty} 3\left(\frac{1}{4}\right)^k$

converges; 1

27. $\sum_{j=1}^{\infty} 5\left(\frac{3}{2}\right)^j$

divergent

Practice Review

28. A certain species of fox has a population density growth of 5.9 per square mile, per year in a certain region. Write an explicit rule for the sequence that represents the yearly density of fox in this region if the starting density is 8 fox per square mile.

$a_n = 8+5.9n$

Solve the following equations.

29. $\sqrt{4x-23}-3=2$

$x=12$

30. $\sqrt{x-6}=x-6$

$x=7,6$

Factor the following polynomials.

31. $12x^2+25x-7$

$(4x-1)(3x+7)$

32. $125x^3-64y^3$

$(5x-4y)(25x^2+20xy+16y^2)$